



USE KNOWLEDGE, CAUTION TO BATTLE WINTER'S DEADLIEST DUO – FROSTBITE AND HYPOTHERMIA

V Corps Safety Office release

When it is very cold, especially in high winds or wet weather, it is more difficult to keep the body warm. In those kinds of conditions, frostbite and hypothermia become very real threats. Knowing how to prevent them, how to detect them, and how to treat them, could help save limbs or lives from these worst of cold-weather injuries.

Frostbite

Simply put, frostbite occurs when the fluids and tissues of the skin freeze. In more detailed terms, tissues start to freeze when exposed to deep cold for long periods, and ice crystals form within the cells. As fluid inside the cells freezes, fluid from outside the cell enters. The level of salts and fluid in the cell rises, and this increase or the presence of ice crystals may cause cells to rupture. As this ice melts, salts move into the tissue and damage cell membranes. As cells are destroyed, tissue dies and is lost.

Frostbite presents the greatest immediate danger to the body's extremities: nose, cheeks, ears, toes, and fingers. Mild, or superficial, frostbite usually results in blistering and minor tissue loss. Deep frostbite can involve muscle and bone.

The first sign of mild, or superficial, frostbite is a reddening of the skin. Lighter skin will then turn a blotched white, gray or yellow. But these color changes are not be as readily apparent on darker skin, which means that when there is a potential for frostbite, it is vital to pay closer attention to frostbite's other warning signs.

Those signs include skin that becomes completely white that may blister, normally about 12 to 36 hours after exposure, and then begins to flake.

As the condition progresses to deep frostbite, the body part will feel very cold or numb, and become yellow and waxy. In advanced stages of frostbite, there is no feeling at all in the exposed skin. The frozen tissue may feel solid or "wooden" when touched, and will be painful when it thaws. The area will turn a discolored red-violet one to five days after injury, and usually becomes gangrenous.

Frostbite victims normally also suffer from hypothermia, and this must be addressed before attempting to treat frostbite. Hypothermia will be discussed later in this article.

The best thing to do next is get the victim to immediate medical treatment. Loosen his clothing if necessary and remove any jewelry he is wearing. If the victim is suffering from deep frostbite or must go back into the cold, do not thaw the frostbitten area.

If medical treatment is not available, it is vital to follow the first aid instructions for frostbite very carefully.

To treat frostbite, keep the victim as dry as possible. Bring him inside a shelter or to some other warm place at the first opportunity. Place the frostbitten part lower than the victim's head to increase blood flow. Do not give the victim alcohol; it can contribute to increased fluid buildup. Smoking can similarly increase a person's chances of becoming frostbitten.

Warm the frozen body part by putting it in warm -- never hot -- water around 105 – 110 degrees Fahrenheit. The temperature can be checked with a thermometer, and should be kept constant by adding more warm water as needed. Do not, however, add warm water directly on the injury. Do not rub or move the frozen part, warm it with dry heat, or expose it to open flame. Never rub snow on a frostbitten area or soak it in cold water.

Superficial frostbite on small areas of the face, nose or ears can be re-warmed by having a person with normal body temperature place his hands on the frozen area. Feet can be re-warmed by having the victim place his feet under a buddy's clothing against the bare abdomen.

Once the affected area is thawed, the victim should gently exercise it to restore blood flow. If the victim has deep frostbite, do not allow him to walk if his feet are frozen.

Again, if the victim must go back into the cold, or there is no guarantee that the frostbitten area will stay warm after thawing, do not thaw it.

Protect the affected areas from further cold or trauma, and get medical attention for the victim as soon as possible.

The best way to prevent frostbite is to avoid extreme cold whenever possible. Those who must brave the cold should wear loose, layered clothing that protects the face, nose, ears, fingers, and toes as well as the body core. They should not stay still for long periods, and wiggle or exercise their toes and fingers periodically. Carrying extra socks and mittens or gloves and checking feet when possible is a good idea.

But going it alone is a bad idea -- it's best to use the buddy system, to have someone along who can check frequently for the symptoms of cold-weather injury. And when a body part starts to lose feeling, tingle or becomes painful, it's time to get inside and warm up.

Eating well is also vital in the cold. Outdoor activity in winter weather can burn as much as 6,000 calories a day, and the body's limited reserves of energy-producing glucose need to be replaced every few hours. A person working or exercising to stay warm needs to eat heartily to provide the fuel to stay warm. A balanced diet with larger-than-usual portions is essential; experienced outdoorsmen often eat three full meals and repeated small snacks each day to combat the cold.

Hypothermia

Ever get the shivers in the cold? Well, that's the body's response to a drop in its core temperature; a condition called hypothermia which can go from mild to deadly.

It doesn't even require severe cold to bring on hypothermia. If a person is not dressed and protected from the cold, well hydrated, and eating properly, he can be a victim of the cold without freezing temperatures. A person can actually survive

longer on a 10-degree Fahrenheit day with sunshine and still air, than on a 40-degree day with wind and rain.

As the body's core temperature drops and hypothermia begins to set in, involuntary shivering begins as the body attempts to warm itself. But even shivering can be hazardous when it interferes with a person's coordination. Loss of muscle coordination and control usually begins with fine motor tasks in the hands, and can deteriorate to a point where even the simplest tasks become impossible. The hypothermia victim may also become mildly confused, disagreeable or apathetic. As core temperature drops, he may become weak and clumsy and stumble frequently.

Hypothermia victims become severely dehydrated. Their blood volume drops, causing the vital organs to work less efficiently and compounding the severity of the problem. The kidneys will extract even more fluid due to a condition known as "cold diuresis." The victim will feel a need to urinate more frequently, and should do so, as urination empties the bladder, which can help the body lose heat when full.

When the victim's core temperature drops below 90-92 degrees Fahrenheit, he begins to experience profound hypothermia. Shivering stops, speeding up the body's cooling process, and warming the skin may stop the shivering without raising core temperature. The victim may eventually get very confused, disoriented and illogical, to the point where he becomes careless about protecting himself from the cold, and may even remove his protective clothing. Thinking becomes slow; memory for specific facts deteriorates, and decision-making is difficult. The victim may lose the will to live, and want to sleep. He may alternate between periods when he appears active and willing to cooperate and periods when he is unresponsive. He may even drift in and out of consciousness.

Eventually the victim's breathing becomes slow and shallow; his pulse becomes weak, slow and irregular, and muscle function continues to degrade until he may not be able to stand. His skin becomes cold, stiff and pale or slightly blue, and he may have evidence of frostbite. His breath may smell "fruity," due to incomplete metabolism -- a sign of extreme danger. His clothing may become soaked with urine. Eventually he will lapse into a coma. He may lose his sight before becoming comatose. His heartbeat will become erratic and any shock may set off ventricular fibrillation, a condition in which the lower chambers of the heart beat rapidly and irregularly and blood flow to the body ceases. Eventually he will go into cardiac and respiratory failure and die.

Once profound hypothermia becomes severe, however, the victim can go into a state called "metabolic icebox" and appear to be dead. But it may be impossible to tell until he has been re-warmed to near normal core temperature.

Certain conditions can aggravate loss in body temperature and speed hypothermia. Alcohol, some medications, low blood sugar and exercising to exhaustion all interfere with the body's ability to shiver, and can help bring on hypothermia. Alcohol is such an excellent conductor and freezes at temperatures so much lower than water, that drinking alcohol at extremely cold temperatures can flash-freeze the inside of the mouth and can kill a person if the back of the throat and esophagus become frozen.

Wet clothing also speeds body heat loss very quickly, as water can "conduct" heat away from the body 240 times faster than air. Sweat-drenched clothing causes heat to conduct toward its surface, and wet outer layers cause more heat to evaporate from the body into the air. Clothing that is soaked inside and out can be deadly in

the cold. The ground also conducts heat quickly, which is why a sleeping bag, pad or other insulating barrier is necessary to stay warm when sleeping outdoors.

To treat mild hypothermia, the victim must be protected from further cooling, brought to shelter if at all possible, and kept warm by any means. Heat sources such as hot water bottles, heating pads or warm stones can be placed at the points where the body is least insulated, such as the trunk and neck. Wet clothing should be removed and replaced with dry clothes. The victim can be given warm liquids to drink, but never be given alcohol.

But the most effective way to raise the body's core temperature is with work or exercise. Hiking is a good heat producer, because the large leg muscles produce more heat than the body's smaller muscles. If hiking is not possible, repeated exercise such as stepping up and down on a log, rock or other surface can be helpful.

Generally, victims of mild hypothermia will recover completely once they warm up.

Victims of severe hypothermia should be given immediate medical treatment if at all possible. If it is necessary to treat a severely hypothermic person, steps should be taken to reduce heat loss; to give the victim fuel and fluids, and to add body heat.

No matter how cold, a victim can still re-warm himself more efficiently than external sources. To reduce heat loss, a "hypothermia wrap" can be constructed that provides an insulating shell. The victim should be kept dry, including free of sweat. A wrap of multiple sleeping bags, wool blankets, clothing or other items can be constructed to create at least four inches of insulation around the victim, and then

wrapped in plastic as protection from wind and water. Contrary to popular belief, the victim should not be put naked into a sleeping bag with another person.

The victim should be given fuel and fluids. In cases of severe hypothermia, the stomach will shut down and cannot digest solid food, but can absorb water and sugars. A mixture of warm water and sugar or Jell-O given every 15 minutes will be absorbed directly into the bloodstream and provide calories for warming. At the same time, the victim will need to urinate more, which will aid in the re-warming process, but also necessitate making sure he stays hydrated.

Heat should be applied to the victim to transfer heat to his major arteries -- the carotid at the neck; the brachial at the armpits; the femoral in the groin, and the palms for the arterial arch. Warm rocks, hot water bottles, towels and compresses can be used. If a person is severely hypothermic, rescue breathing can also increase oxygen and provide internal heat.

